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Suggested Complementary Measures for The Indonesia Anti-Illegal Unregulated and Unreported Fishing Policy

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Abstract

Illegal Unregulated Unreported (IUU) fishing threatens marine biodiversity and associated economic values. Recognizing this, the Indonesian government exercises a tough anti IUU fishing policy. The policy generates both success stories and failure issues. Biological parameters are better: disappeared species returned, catch per unit effort CPUE increased, fish size becomes larger, fishing trips are shorter. However, data show that the stock utilization is not optimum, fishing discard is high, and fishers' income remains low. This study is aimed to formulate measures necessary to minimize side effects. Data were collected from selected landing places. It is concluded that the most notable factors causing detrimental side effects are lack of carrier vessels, inadequate cold handling infrastructure, poor processing facilities, and high shipping costs. Among complementary policy options, the most strategic one is integrating the anti IUU fishing policy with the national marine toll program. This paper also suggests that more frequent shipping and larger quota should be allocated by the program for transporting marine products from the production centers to processing, export, and consumer locations.

Keywords: IUU, Marine Toll, Policy Side Effects, Policy Success and Failure

Introduction

The potential number of Indonesian annual marine fish production of Indonesia is 12.54 x 10^6 t [1]. However, statistics show that the actual production is recorded only less than 7 x 10^6 t [2]. IUU fishing has become a factor that caused sub-optimal production level. It is estimated that value of losses associated to IUU fishing practices in Indonesia hits an amount reaching IDR 30 x 10^9 / year [3]. In 2014, the Indonesian government, c.q. the Ministry of Marine Affairs and Fisheries responded to the situation and started a program specifically aimed at combating IUU fishing practices. Relevant regulations were formulated and introduced to back up the program. Ministerial Regulation No. 1/2015 re. Size and Conditional Restriction on Catch of Lobster and Crabs Fishing [4], Ministerial Regulation No. 56/2014 re. Moratorium of Permit for Foreign Fishing Boats [5], Ministerial Regulation No. 2/2015 re. Banning of Trawl Fishing [6], Ministerial Regulation No. 57/2014 re. Prohibition of Transshipment [7].

An implementing unit called the Task Force for Eradication of IUU Fishing executes enforcement of these regulations. This task force is supported legally by the Presidential Regulation No. 115/2015, which states a number of tasks and authorities [8]. The main tasks of this force are to develop and to implement law enforcement operations to eradicate IUU fishing in Indonesia's marine jurisdiction effectively. In this context, the task force is expected to optimize the use of personnel and operating equipment, including ships, aircraft and other technologies owned by several related national institution such the Ministry Marine and Fisheries, Indonesian Navy, National Police, etc. To enable to exercise the tasks, the force is also equipped with a number of authorization. This includes authorization to (i) determine law enforcement targets, (ii) coordinate data and

information collecting, (iii) establish order elements to carry out operations, and (iv) perform command and control for facility mobilization.

There are pros and contras on the government's policies [9]; nevertheless, the Ministry of Marine Affairs and Fisheries claims a number of success stories following the implementation of the program. First is the claim that national fish stocks available for sustainable harvests has risen sharply from 7.3 x 10^6 t / year in 2013 to 12.5 10^6 t / year in 2017. Then, there was a decline in import of up to 70 %; in 2016, the import was only 20 % of the available quota. Furthermore, community fish consumption has increased from 37.2 kg per capita in 2014 to 41.1 kg per capita in 2015, and 43.9 kg per capita in 2016. [10]. Macroeconomic records show that the GDP of fisheries reaches 6.79 %; this number is higher than the national GDP (5.03 %) and agricultural GDP (3.91 %). It was also claimed that fishers' purchasing power increased, tax revenue are bigger, and global trade balance got better. Furthermore, it was claimed that biological parameters are better: disappeared species returned, CPUE increased, fish size becomes larger, fishing trips are shorter [11].

However, previous data sources mention that there are remaining issues that have to be must be addressed. These sources show cases of inefficient utilization in a number of fish production centers: fishing discard is high, and fishers' income remains low. Merauke Regency is a perfect example to illustrate and study the outstanding problems. Fish stocks in this district were traditionally exploited by foreign fleets [12]; after several years since the declaration of foreign ship moratorium policy by the Ministry of Maritime Affairs and Fisheries, fish stocks abundance increased significantly and this situation made an easier situation for local fishermen to catch fish. Unfortunately, such increasing stock abundance failed to deliver maximum benefits; in other words, the resource is used sub-optimally. Among others, the reason is that some stocks were left unharvested due to lack of facilities necessary to transport the fish to market destinations outside the region. In other cases, sub-optimality occur due to hi-grading where fishermen only collect high-value fish body parts and dispose other parts [13].

Various programs have been developed to improve the situation. The latest is status improvement of the existing fishing port, from a provincial level to a national one. The decision of the Minister of Marine Affairs and Fisheries numbered 43/KEPMEN-KP/2018 signifies this status improvement. This fishing port is equipped with various supporting facilities that are built on land covering an area of 20 ha [14]. The support facilities of which is where the fish auction and ICS (Integrated Cold Storage) of capacity 200 t, all of which is meant to accommodate more harvest from fishermen [15]. The progress is good; so far, inter-island marketing increased significantly, mainly to destinations in Java Island [16].

Despite the existing programs, a number of serious problems still remain. Delivery of fish to the island of Java is served by only one carrier owned by the national fisheries company, PT Perindo [17]; meanwhile, the potential increase in the catch is still high [14]. In addition, hi-grading practices is even more alarming; higher abundance of fish in the water means more fish available for fish maw hunting, and this means that more fish parts will be discarded [18]. Limited space of existing fishing boats, the absence of collecting boats and lack of technology available for fishers to process the currently discarded fish parts. Marketing to other islands is not economically feasible because transportation cost to and from this region is very high; literature has reported that transporting merchandise to this region is much more expensive compared to other regions or even foreign places [19; 20]. All of this has led to 40 % of fish discard [21]. The above provides a background for the study reported in paper, which aims to identify measures necessary to minimize side effects of the Indonesian Anti IUU program, where Merauke Regency, which is located in the eastern part of Indonesia, is used as the study case.

Materials and Methods

The research was done in June 2018 following the case study methodological approach and took Merauke Regency as the focus location. Figure 1 shows the location of Merauke Regency in the Province of Papua.

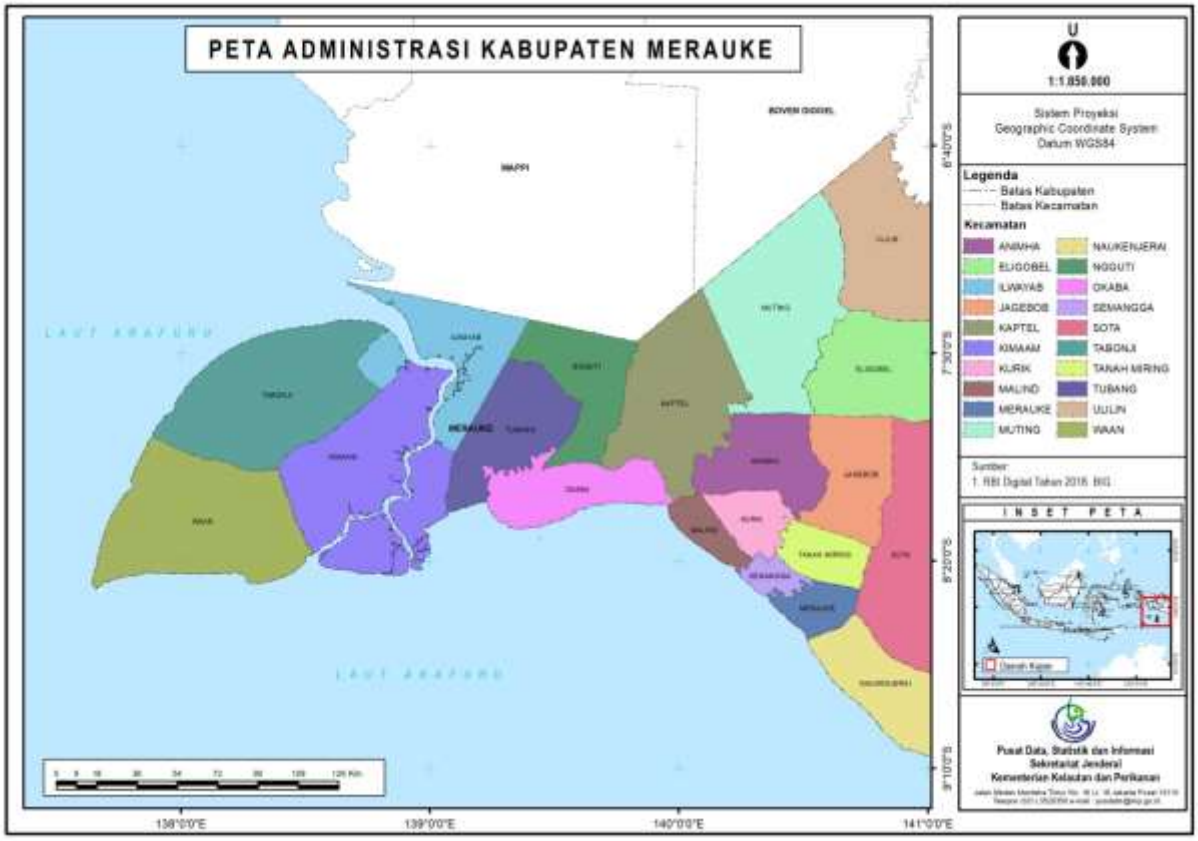

Fig. 1. Map of Merauke Regency, Papua Province, Indonesia

Referring to the existing problems, a number of complementary policy options were considered to improve the situation. Then, the SWOT analysis [22] was applied to determine the best policies. Basic data for this analysis were primary data, which were obtained through a survey involving respondents selected purposively. Interviews were conducted with relevant groups and individuals consisting of three fishery product traders, two inter-island shipping service managers, two cold storage owners, five fishermen, two fish product processors, and two provincial fisheries officials. Other data were secondary data, which were collected through reviews of documented reports. Focused Group Discussions were also performed to fine-tuned data. Referring to the SWOT technique, the data were grouped into the Strength, Weakness, Opportunity and Threat (SWOT) element categories. These SWOT elements were weighted and analysed to identify ranks of strategy options. In general, this analysis includes the following steps: (i) identification of internal and external strategic factors, (ii) writing the internal strategic factors analysis summary (IFAS) and external strategic factors analysis summary (EFAS), (iii) identification of alternative strategic policies, and iv) writing a quantitative strategic planning management (QSPM) matrix to determine the best strategic policy alternatives based on priority scales.

Results and Discussion

1. Problem chronology

Major problems occurred shortly following the enactment of the moratorium policy on foreign ship permits in 2014. The reason was the local fishing's dependent on foreign companies, which were affected by the moratorium policy. Fisheries entrepreneurs who operate ships weighing more than 30 GT, with a number of trips of once a month and production of 10-20 t per trip, lose income up to billions rupiah after the moratorium was implemented. The loss occurred because the collector of their catch was exposed to the moratorium policy and stopped operating. Meanwhile, the loss of 10 GT vessel owners, with trips twice a month and 10 t per trip,

suffered a loss of around IDR 200 x 10^6 / month /vessel. At that time, thousands tons of fish were dumped in the main warehouse in Merauke Regency due to the moratorium by the Ministry of Maritime Affairs and Fisheries [23].

On the other hand, the moratorium was a blessing for local fishermen in Merauke Regency. The marine water of Merauke Regency was no longer filled with foreign trawl vessels, once dominating the Arafura Sea of Merauke Regency [24]. The stretching of local capture fisheries in the regency was marked by an increase in demand for new fishing boats at the shipbuilding centers in the region [24]. Furthermore, fish that previously disappeared re-emerged; meanwhile, thin stocks were replenished. The duration of the trip for fishermen is shorter, but the results taken home are more numerous.

Success stories did not last long. Problems arose following the increase in high fish abundance. The facilities and infrastructure in the Merauke Regency did not allow maximum capture and marketing. In line with this, various responsive policies were implemented by the Ministry of Maritime Affairs and Fisheries. Among these policies was the facilitation of the arrival of fishing vessels from other regions such as Bali and Java to catch fish in Merauke Regency (and Papua) waters [16]. It was reported that 115 ships from these areas were involved in the ministry's policy scheme. Ministry also took advantage of the existence of a state-owned company vessel, Perindo, to transport the caught fish outside the province; the Ministry of Maritime Affairs and Fisheries claimed that with this effort there had been an increase in shipments of fish by 400 % to Java [16].

The arrival of fishing vessels from outside the region and drastic increase in marketing was not enough to absorb the increased fish production. People began to think about improving conditions by taking the opportunities available. One of them was to catch certain types of fish for its part called fish maw. Many of the fishermen who previously caught and marketed fish diverted their operating targets to hunting for fish maw [18]. The number of shipments of dried fish maw from Merauke Regency is quite large; for example, data show that in the first semester of 2018, shipments of fish maw from Merauke Regency reached 82000 kilograms [24]. The high price makes hunting of fish maw continuously increasing [24].

Unfortunately, while this economic activity generated large profits for fishermen, it in facts also created new problems. Fishermen chose to take only the fish maw and disposed of fish meat because the value is far below the price of maw [13]. The moratorium has made it easier for Merauke Regency fishermen to catch fish containing high-priced maw, but this means that the amount of discarded fish was even greater. In addition to its low price, the meat also was not feasible for utilization because of lack of processing technology and limited market for the processed products.

At the end of 2015, the government has proposed a plan to upgrade a pier in the Moro River estuary to become a fishing port in Merauke Regency [14]. The semi-finished concrete construction pier is indeed not functioning; no small fishing boats coming, although actually there are more than 350 small vessels sizing up to 30 GT in Merauke Regency in 2015 [14]. The dock cannot be used for small fishing boats because of the high pier [14]. The pier is not far from the port of Merauke Regency, which has been a multi-function port as a passenger ship, loading and unloading goods as well as fishing ports. [14]. In time, the dock is projected to become an integrated marine and fisheries area that will be able to improve the regional economy and benefit of local fishermen [14]. The integration includes a number of relevant aspects including the environment, facilities and infrastructure, institutions, human resources, markets, and regulations [14].

Based on the growing need and following previous research [25], the Merauke Fisheries Port was established in 2016. Since then, service activities have continued to increase, now covering approximately 600 fishing vessels [11]. Supporting facilities for fishery ports were also improved, and this includes fish auction place and an integrated cold storage (ICS) which has storage capacity of 200 t. Facilities in the fishing port of Merauke Regency is continuously improved; for example, in 2017, a hygienic fish auction place was established.

From this description can be concluded that despite various achievements, the fisheries condition in Merauke Regency still faces major challenges. The two big challenges are (i) the fact that a large number of catch cannot be marketed and (ii) increasingly high amount of fish discard. Figure 2 diagrammatically summarizes the chronology of the problems in the MeraukeRegency fisheries.

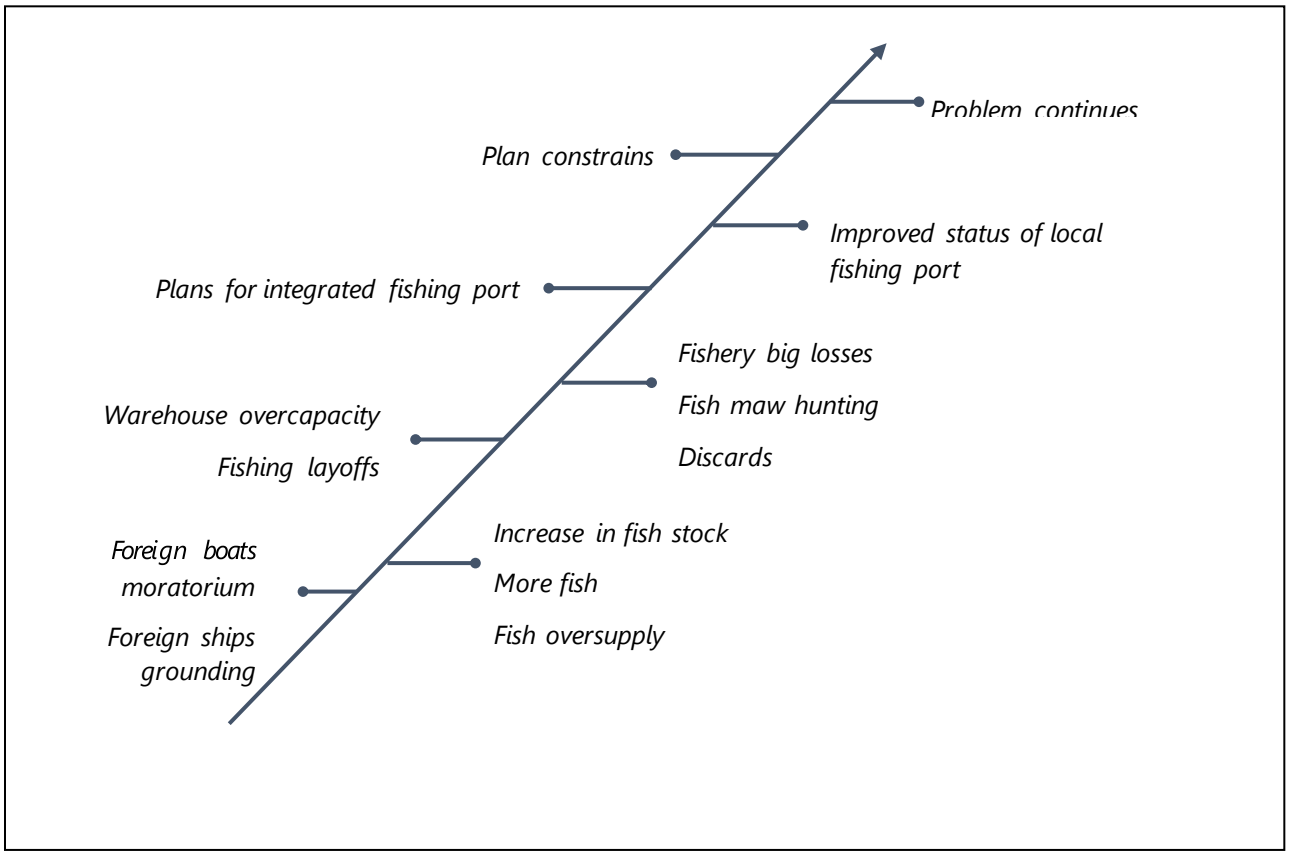

Fig. 2. Problem chronology

From the information collected through site observations, survey, review as well as focused grouped discussions, a number of remaining problems were identified. Table 1 summarize these problems. Following this problem summary, a focused group discussion (FGD) was held in this series of studies. FGD participants raised general concerns about the urgency of a complementary policy necessary to deal with two major questions. The two major questions are: (i) how to collect, handle and process catches (and wasted parts) from fishing grounds, (ii) how to deliver catches and fish products to market destination.

Table 1. Summary of remaining problems.

Issues	Remark
Limited local market potential	1) Compared to the level of total production, the amount that can be absorbed by local market is negligible, only 3 times a day 2) Local people only consume few species: Chinese herring (*Paha paha*), (four-finger threadfin (*senangin*), white-spotted hawkfish (*kakap Batu*), dolphin fish (*lemadang*), giant trevallyrs

	(*Kue*) and vannamei shrimp (*udang putih*), all of which are sold as fresh fish
Lack of capital for regional market development	3) Only few large companies have the capacity to work on regional and international market businesses, mainly because such businesses require large capital to establish and processing, freezing, storing and shipping activities
Migrant domination and the limitations of technology in processing SMEs	4) The existing processing technology is generally controlled by migrants and is limited to simple methods, such as salted fish, fermented fish paste (*terasi*), shredded fish meat (*abon*), and dried velvet shrimp (*sergestoidea*) processings.
Quality issues in regional marketing	5) Quality disparities are still the main factors that contribute to price variations of the processed products delivered to regional and international markets.
High grading issues	6) Continued and the more severe tendency of people disposing low-priced parts, namely meat and only collecting high-value portions, namely fish maw

2. Swot Analysis

Internal factor analysis

Problems related to the collection, handling, processing and marketing of fisheries commodities and products in Merauke Regency are influenced by various internal factors, both of which directly or indirectly have an impact on efforts to optimize the availability of abundant fish catches. The summary of information of these internal factors is the as follows:

1. Some people already have experience in the local fishing industry on the downstream side. These actors, for example, are traders, middlemen, fillet processors, dried fish processors, and frozen product processors. Among these actors, most of them are middlemen for various business scales which number around 40 people and who focus on various types of fish. The rest are processors of various scales, whose numbers are less than 10, and owners of fish freezing companies, which are three people

2. The community, especially those who have previously tried their luck in fish processing businesses, are actively seeking opportunities to take part in various training related to fisheries processing. The training organized by the government and NGOs generally revolves around simple processing techniques aimed at developing micro, small, and medium scale business units. Improvements in the methods that have been practiced by the community, the introduction of new methods and the dissemination of technology that have the opportunity to be used to exploit fisheries commodities that have not been utilized are examples of training fields that are of interest and participation by the community.

3. Good quality local unique fish commodities have many enthusiasts outside the area are available in abundance, e.g., Toraja Swamp Snakehead. This commodity is something that can be used as a mainstay for Merauke Regency people to strengthen their position in the market. Even with only salting techniques, these processed products from the typical species from Merauke Regency sell well in the market. In addition to Toraja Swamp Snakehead, there are a number of other typical fish species that can also strengthen market capacity of Merauke Regency, for example freshwater lobster, large tilapia, etc.

4. A moderate estimate shows that every year 3000 t of high-economic value fish are wasted and, if collected will become available as raw material to be processed into value-added products. The number of shipments of dried fish maw from Merauke Regency is quite large. Yearly, no less than 150 t of dried fish maw are exported from this area. According to an inter-island trader in Merauke (Pitono, pers.com.), it is estimated that 10 g of dried bubbles are obtained at the expense of dumping 2 kg more meat of fresh fish into the sea.

5. Local fishing fleets are strengthening. At present, the shipbuilding sites in Merauke Regency are increasingly busy due to shipbuilding orders from local residents. The increase in the local fleet is also indicated by the increase in the number of vessels berthed in the fishing port of Merauke Regency, which, based on recent data, has accommodated 600 fishing vessels.

6. The training output indicators are generally low. Apart from the training opportunities provided by the government and NGOs, in general, the sustainability of the training results is very low. Training participants generally are constrained by various things in following up on the results of training; these constraints are mainly related to the lack of capital and post-training information services. According to local government officials and community development activists, trainees who succeeded in developing skills acquired during training were no more than 10 %.

7. Interviews with community development activists operating in the Merauke Regency and surrounding areas indicate that the work ethic of local communities is not as good as that of migrants. This was also recognized by local fisheries service officials. The willingness to take advantage of business opportunities does not exist in the local community in general. For most of these people, business income is usually spent on fun, and the search for new income is done only after their finances are running low.

8. For fish maw fishermen, the fishing vessels used are only small units that do not have adequate fish storage capacity. Instead of accommodating fish meat, fishermen choose to maximize the existence of space on the ship to handle fish maw, which costs much higher than fish meat. On certain occasions, fishermen do dry a portion of fish meat, and that happens only when the fish maw collected is not too much so that space and time are available for fishermen to handle the meat.

9. Collecting vessels necessary to optimize catches (and wasted parts) in various fishing ground are very limited. In addition to the constraints of shipping outside the region, inter-island traders in the Merauke Regency also complained about the limitations of feeder boats that allowed fish collection from scattered fising grounds. The absence of these feeder boats causes catches in many locations to not be fully utilized. Large-sized boats can only stop and accommodate fish in some of these locations. In addition to causing wasted opportunities to get bigger fish production, this also reduces the opportunity to get fish at competitive prices.

10. Based on the above, Table 2 shows an IFAS matrix, which summarizes the results of weighted and rated strengths and weaknesses in the optimization efforts. This IFAS table shows that the strength value is 1.44, while the weakness value is 0.46. Based on this, a positive strength-weakness vector is obtained, which is + 0.98, and this means that internal conditions have a power to overcome weakness situations

Table 2. IFAS Matrix for optimizing Merauke fisheries values of catch

Internal Factors	Weight	Rating	Score
Strength			
1. A number of actors are actively engaged in the downstream businesses, serving as traders, middlemen,	0.13	2.0	0.26

	fillet processors, dried fish processors, and frozen product processors			
2.	Fisheries processing groups began to be active in technological coaching activities organized by the government and NGOs	0.13	2.0	0.26
3.	Good quality local unique fish commodities that have many enthusiasts outside the area are available in abundance, e.g., Toraja Swamp Snakehead	0.08	4.0	0.31
4.	Wasted fish meat in fish maw fisheries is available in large quantities	0.10	4.0	0.4
5.	Local fishing fleets are strengthening	0.10	2.0	0.2
	Total Strength			**1.44**
Weakness				
1.	The training output indicators are generally low	0.13	1.0	0.13
2.	The work culture of the indigenous people is not as good as that of migrants	0.13	1.0	0.13
3.	The capacity of ships and fishermen to handle wasted fish in fish maw fisheries is very limited	0.10	1.0	0.10
4.	Collecting vessels necessary to optimize catches (and wasted parts) in various fishing ground are very limited	0.10	1.0	0.10
	Total Weakness			**0.46**
	Total Internal Factor	**1.0**		**1.90**

External factor analysis

Problems related to the collection, handling, processing and marketing of fisheries commodities and products in Merauke Regency are also influenced by a number of external factors, both of which directly or indirectly have an impact on efforts to optimize the availability of abundant fish catches. The summary of information on these external factors is as follows:

1. With a harvest potential of approximately 800 000 t year^{-1} (530 000 t pelagic, 248 000 t demersal, 22 000 t prawn and 4 000 t squid), the Arafura Sea off the coast of Merauke Regency is indeed the second best "fishing ground" in the world. In terms of fertility, Arafura waters can only compare with South African waters. Currently, only about 20 % of this potential is actually exploited. This fertility is evidenced by the case of many foreign vessels interested in coming and catching fish in these waters at times before the illegal fishing policy was enacted.

2. Continuous development plans for Merauke Fishing Port. Increased facilities at the Merauke Fishing Port continue to be made to improve service to ships that land fish there. After increasing the dock capacity in the previous year, the development continued with the construction of hygienic fish auction place and integrated cold storage (ICS) with a capacity of 200 t in 2017. The development continues so that the fish produced or caught by fishermen entering the Merauke Fishing Port can be accommodated and handled properly.

3. Sixty hectares of land are available for further integrated supporting facilities development around the pier. This land has been controlled by the local government so that the development of the facilities above is no longer expected to face serious obstacles. For Merauke Regency in particular and Papua Province in general, land ownership is one of the main problems that often disrupts the development process because most of the land is in communal ownership. Thus, ownership by the government really is a positive factor required for further development of the fishing port.

4. Integrated Cold Storage with a capacity of 200 t has been built. Cold storage with this capacity is indeed relatively not too large compared to the size of the existing production potential. However, the integration aspect adopted by the cold storage is a good start, which is expected to trigger the development of similar facilities in Merauke Regency, which in the end can support the development of efforts to create value-added to the abundance of fish production in the region.

5. Market potential in Java and other provinces is very promising, especially for frozen whole and fillet, or dried spanish mackerel (tengiri) (*Scomberomorus*), stripped threadfin (loc. Kuro) (*Eleutheronema tetradactylum*), barramundi (loc. kakap putih) (*Lates calcarifer*), and swamp snakehead (loc. ikan gabus Rawa) (*Channa striata*). So far, the island of Java in particular and the western part of Indonesia in general are regions with a high human population whose fish supply from surrounding areas is far below that in eastern Indonesia. On the other hand, high fish production with relatively low demand makes eastern Indonesia waters, including Merauke Regency, able to provide fish at competitive prices even though they must be marketed in locations as far away as Java and other western parts of Indonesia.

6. There is a shipyard that produces fishing vessels in Merauke Regency. The existence of a fishing boat production center in Merauke Regency allows people to get fishing boats that are suitable for local needs and conditions. So far, there has been frequent assistance programs for the procurement of fishing boats from the central government, the specs are not exactly as needed by the community. The boat-making center located close to the fishermen's residence will allow them to interactively communicate their wishes in detail to the shipbuilders where they order fishing boats.

7. The central government has introduced the sea highway program (*tol laut*). Sea highway is a sea logistics transportation concept developed by the Indonesian government, aiming to connect large ports in the archipelago. Given the connections between these sea ports, it is expected to create smooth distribution of goods and even distribution of logistics prices to remote areas. In the context of the delivery of commodities and fishery products from Merauke Regency outside the region, one of the applied forms of this concept is the operation of transport vessels carrying trade from Merauke Regency to port cities in western Indonesia.

8. Supply of raw materials for fish processing depends a lot on the season. While buyers in markets require supply continuity, exporters from Merauke Regency often find it difficult to fulfill. For almost all fish species, the level of production fluctuates between seasons. These fluctuations vary between one type of fish and another, but for some species, this fluctuation in production greatly disrupts trading activities; Among the examples of commodities that are often disrupted by trade activities are fish maw, which happens to be an important commodity in the fisheries of Merauke Regency and which deals with foreign buyers who often apply strict requirements.

9. The available capacity of existing cold storages is very limited. Apart from the completion ICS having a capacity of 200 t, as previously mentioned as an opportunity in the previous section, the total capacity of cold storage available at this time is very inadequate. Including facilities owned by foreign ex-companies that are now idle, the total clod storage capacity is only around 6000 t. For the current production level of 150 000 t $year^{-1,}$ a total cold storage capacity of at least 10 000 t is needed. This is considering that the potential for local market absorption is very insignificant; most of the production must be stored before

being sent outside the area. The shortage of cold storage capacity will be more evident if production increases near the existing resource potential, which is 800 000 t year^{-1}.

10. The supply of ice cubes or ice blocks is very limited and expensive because of the limited capacity of existing ice factories. Ice blocks are a vital requirement for most fishing boats in the Merauke Regency. The fishing boats are generally not equipped with refrigerated spaces so that preservation of freshness of fish is very dependent on the coldness of ice added to the catch. An ice factory is available in Merauke Regency but is currently in a malfunctioning condition. Some fish vendors treat it by buying ice in retail from home ice producers; this kind of thing does not apply to fishermen because they need quite a lot of ice.

11. The frequency of fisheries training is very minimal. The training service provider closest to the user is the local fisheries service; however, local service providers are limited in terms of funding and capacity to train them. As a result, the training provided is very limited, the frequency and quality. Alternatively, available government services from central institutions based in the national capital or NGOs based in the same region. These central institutions and NGOs provide training materials that are better than local institutions. With technological advancements that are always being updated, these two alternative service providers can provide the best training services to their users. The disadvantage is that central institutional activities are sporadic while NGO activities are based on projects so that they are often cut off halfway.

12. There is a transport vessel operated by the central government in the context of a sea highway program that makes stops at Merauke Regency and is expected to bridge trade interests between eastern Indonesia including Merauke Regency and areas in the western part of the country. Merauke in particular and other areas in Eastern Indonesia generally lack basic infrastructure related to roads, electricity, fuel and clean water is in poor condition. In fact, these items are very vital to support the functioning of other important facilities. Cold storage owners, for example, say that cooling operations at their facilities are severely disrupted by frequent cuts in electricity supply in the area. Meanwhile, ice factory operators and fish auction managers complain about the severe supply of clean water.

13. Costs for transporting fish from Merauke Regency to Java: the cost of transporting fish from the eastern region, including Merauke Regency to the western parts of Indonesia, is known to be expensive. The cost of domestic shipment exceeds significantly the cost of transporting goods from China to Java. The transportation fee is not less than IDR 4300 kg^{-1}. This makes some fish uneconomical to be marketed in Java, even though these fish are in great demand and have very cheap prices in their home regions.

14. Based on the above, Table 3 shows an EFAS matrix, which summarizes the results of weighted and rated strengths and weaknesses in the optimization efforts.

Table 3. EFAS Matrix for optimizing Merauke fisheries values of catch

External Factors	Weight	Rating	Score
Opportunity			
1. The Arafura Sea off the coast of Merauke is indeed the second best "fishing ground" in the world			
2. Continuous development plans for Merauke Fishing Port	0.09	3.0	0.27
3. Tens of hectares of land is available for further integrated supporting facilities development around the pier	0.05	3.0	0.15

4.	Integrated Cold Storage with a capacity of 200 tons has been built	0.07	3.0	0.21
5.	Market potential in Java and other provinces is very promising, especially for frozen whole and fillet, or dried spanish mackerel (tengiri) (*Scomberomorus*), stripped threadfin (loc. Kuro) (*Eleutheronema tetradactylum*), barramundi (loc. kakap putih) (*Lates calcarifer*), and swamp snakehead (loc. Ikan gabus Rawa) (*Channa striata*).	0.09	3.5	0.32
6.	There is a shipyard that produces fishing vessels in Merauke	0.06	2.0	0.12
7.	The central government has introduced the sea highway program (*tol laut*)	0.06	1.5	0.09
	Total Opportunity			**1.52**
Threats				
1.	Supply of raw materials for fish processing depends a lot on the season	0.05	2.5	0.08
2.	The available capacity of existing cold storages is very limited	0.09	1.0	0.09
3.	The supply of ice cubes or ice blocks is very limited and expensive because of the limited capacity of existing ice factories	0.06	1.0	0.06
4.	The frequency of fisheries training very minimal	0.06	1.0	0.06
5.	Transportation modes facilitated by the central government sea highway program are still unreliable	0.08	1.0	0.08
6.	Basic infrastructure related to roads, electricity, fuel and clean water is in poor condition	0.09	1.5	0.14
7.	The cost of transporting fish to market destinations is very expensive	0.09	1.5	0.14
	Total Threats			**0.65**
	Total External Factor	**1**		**0.87**

Based on the results of the internal and external factor analysis, as seen in the Table 2 and Table 3, four strategy options as described in Table 4, are identified. Alternative strategies come with their respective ranks, based on which it can be concluded that the best strategy is the expansive strategy (Table 4).

Table 4. Ranks of alternative strategies

Quardrant	Point positions	Matrix area	Rank	Strategy
I (s-o)	(1.52 ; 1.44)	2.18	1	Expansive

II (w-o)	(0.46 ; 1.44)	0.66	3	Turn around
III (w-t)	(0.46 ; 0.65)	0.30	4	Defensive
IV (s-t)	(1.52 ; 0.65)	0.99	2	Diversification

Referring to the total values of internal factor and external factor, which are both positive, this best strategy is considered feasible. In Figure 3, the resultant coordinate position of these factors is denoted by Point A (0.98; 0.87).

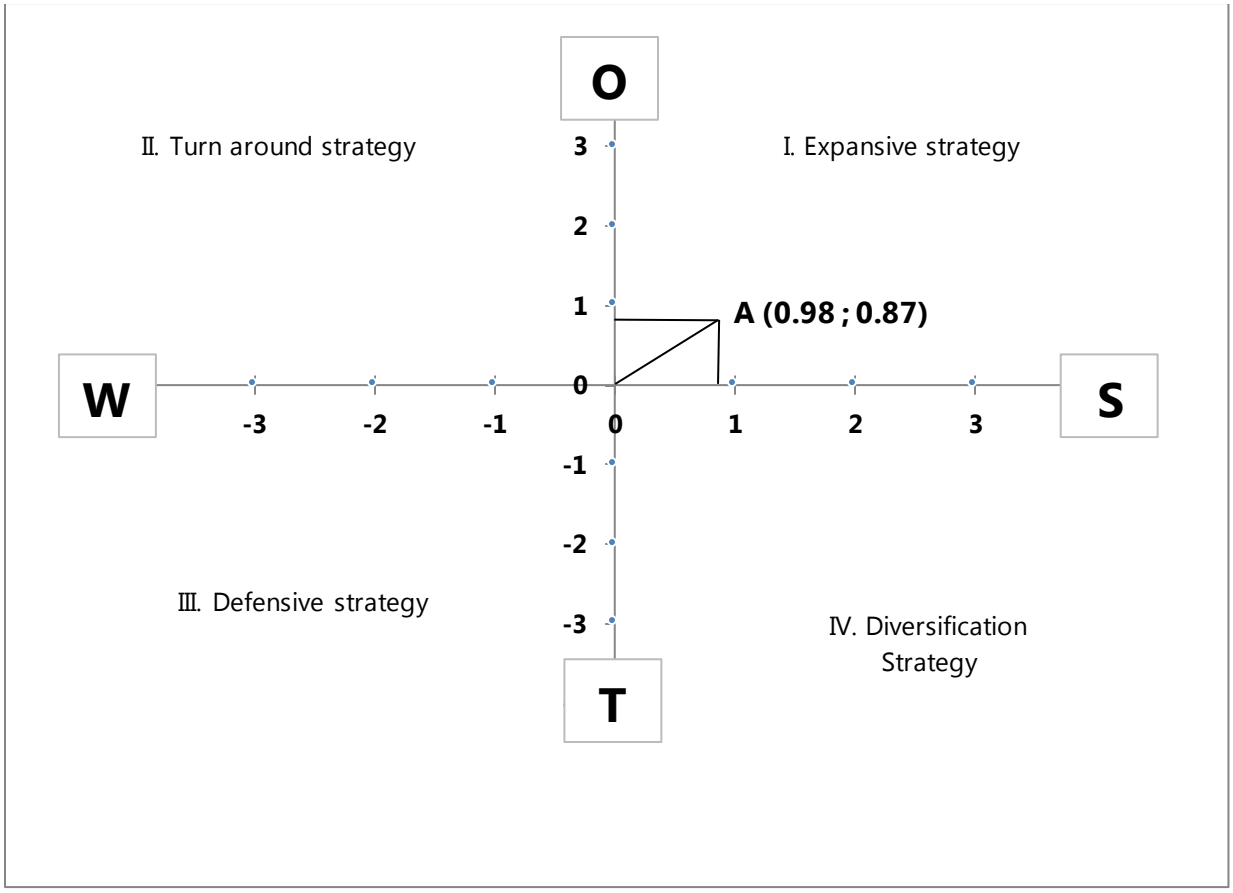

Fig. 3. Map of alternative strategies

Summing up the results of best strategy determination and strength and opportunity factor identification, two strategies are worth considering. These strategies are:

1. Integrating the anti-IUU fishing policy with the national marine toll program to optimize the abundantly available fishery-based trade items. More frequent shipping and larger quota should be allocated by the program for transporting marine products from the production centers to processing, export and consumer locations.

2. Taking advantage of continuing infrastructure and facilities improvement to promote local processing industries

Conclusions

Policies and programmes for IUU eradication in Indonesia have undeniably shown positive results marked by the increase in local fisheries production. The potential negative impacts, such as oversupply and discards occur. However, there are also a number of opportunities that can be realized, such that the benefits of the policies can maximized while the negative effect can be minimized

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